

NASA/Tropical Rainfall Measuring Mission (TRMM)

TOPIC#3: El Niño/La Niña

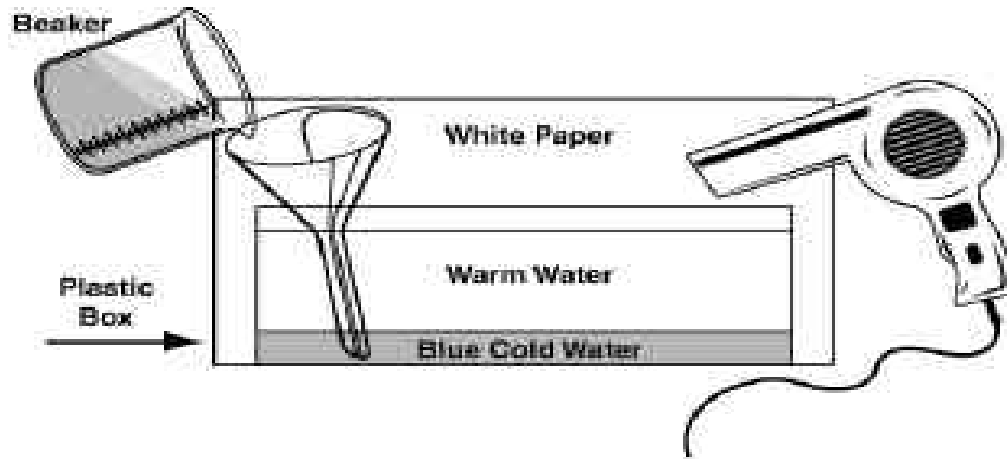
Activity #2: Demonstration -El Nino/ La Nina

OBJECTIVE: To model the interaction between prevailing winds and ocean currents that cause upwelling of cold water.

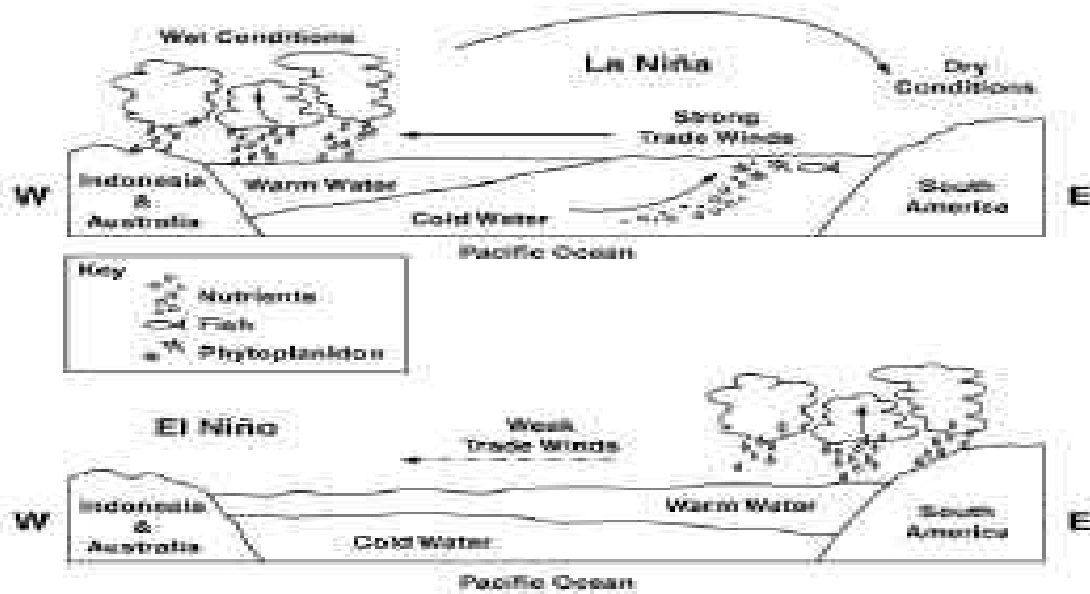
MATERIALS: clear plastic shoe box, long neck funnel, blue food coloring, warm & cold water, hair dryer, one piece of white paper, 50mL beaker, transparency of diagrams or copies for students.

PROCEDURE

1. Fill the plastic box to within 2 cm of the top with warm tap water. A depth of approximately 10 cm is sufficient.
2. Add 10 drops of food coloring to 50 mL of cold tap water.
3. Gently lower the long neck of the funnel to the bottom of the box. Without disturbing the warm water, *slowly* pour the cold blue water into the funnel allowing it to form a layer beneath the warm water. Remove the funnel *slowly*.
4. Hold the white paper behind the plastic box for improved viewing of the layering.
5. Lead students to understand that the model represents the warm equatorial surface water in the Eastern Pacific Ocean with the colder water at deeper depths. Tell them that the layer of contact between the cold and warm water is called the ***thermocline***.
6. Place the nozzle of the hair dryer at one end of the box (***the eastern Pacific***) such that it will create a horizontal airflow over the surface of the water in the box. Lead students to understand that the airflow represents the easterly ***Trade Winds***. On the board, have the students record a hypothesis: If the air flow is directed across the surface of the box, then the cold blue water will _____.
7. Turn on the hair dryer to medium or high speed. Note that as the warm water is blown to the far end of the box (***the western Pacific***), the blue cold water rises up to replace it. Use the term ***upwelling*** to describe this phenomenon.
8. Ask a student to draw on the board an illustration of their observation. As part of a summary discussion, label the following parts of the illustration: ***warm water, cold water, thermocline, upwelling, Trade Winds, eastern Pacific, western Pacific***. Title the illustration – “La Nina”.



DEPL002



DEPL002

Discussion Points:

La Niña: When the Trade Winds are strong, warm equatorial surface water is blown farther to the west. This allows a greater than normal quantity of cold water to rise and replace it. This rising water is called upwelling and it brings to the surface nutrients that fertilize tiny plants called phytoplankton. The presence of plentiful phytoplankton stimulates the food chain and results in an increase in fish populations. The presence of colder surface water also causes drier weather conditions. This occurs as the cold dense air above the water sinks. As it sinks it warms and causes drying conditions. Meanwhile rising warm air in Indonesia results in more frequent rain.

El Niño: During *El Niño* the Trade Winds have weakened. Without the strong winds to blow the warm surface water to the west, the sun warmed Pacific spreads eastward. Due to the presence of the warm surface water, there is no upwelling of cold water. Nutrients that stimulate the food chain are not brought to the surface and the fish population becomes lower than normal. Sea birds, marine animals such as seals and people suffer from lack of seafood. The large quantity of warm water in the eastern Pacific heats the atmospheric air which rises, cools and condenses into heavy rains. Too much rain can result in floods in areas such as the northwestern South American country of Peru.